Amendments to the Claims

1. (Currently amended) A method for calibrating a blood property sensor, the method comprising:

(a) connecting an arterial tubing portion of a dialysis system to withdraw blood from a patient and connecting a venous tubing portion of the dialysis system to deliver blood to the patient;

(b) passing diluted blood having a dilution indicator past the blood property sensor in the venous tubing portion;

(c) determining at least one property of the diluted blood passing the blood property sensor in the venous tubing portion; and

(d) determining a calibration coefficient K of the blood property sensor corresponding to the determined blood property of the diluted blood passing the blood property sensor in the venous tubing portion and the relationship $K = -\frac{V_{Inj}}{V + V_{Inj}} * \Delta U_{Inj}$ where V_{Inj} is a volume of the dilution indicator; $V = (Q_B - Q_{UF}) * \Delta T_{Inj}$ where Q_B is a blood flow rate in the arterial tubing portion, Q_{UF} is an ultrafiltration rate of the dialysis system, ΔT_{Inj} is the transit time of the dilution indicator; and ΔU_{Inj} is integrated over ΔT_{Inj}.

2. (Original) The method of Claim 1, further comprising determining a blood volume change corresponding the calibration coefficient.

3. (Cancelled)

4. (Original) The method of Claim 1, further comprising employing an ultrasound sensor as the blood property sensor.

5. (Previously presented) The method of Claim 1, wherein determining at least one property of the diluted blood includes determining one of protein concentration, saline or electrolyte of the diluted blood.

6. (Previously presented) The method of Claim 1, wherein determining at least one property of the diluted blood includes measuring one of a photometric, optical, electrical or thermal property of the diluted blood.

7. (Previously presented) The method of Claim 1, wherein passing a dilution indicator past the blood property sensor includes passing a known volume of the dilution indicator past the blood property sensor.

8. (Currently amended) A method for calibrating a blood property sensor in a blood system having a vascular portion and an extracorporeal portion, the method comprising:

(a) introducing an indicator bolus upstream of a blood property sensor in the extracorporeal portion to form diluted blood;

(b) measuring a property of the diluted blood with the blood property sensor in the extracorporeal portion; and

(c) determining a calibration coefficient of the blood property sensor corresponding to the measured property of the diluted blood and the relationship $K = -\frac{V_{Inj}}{V + V_{Inj}} * \Delta U_{Inj}$ where V_{Inj} is a volume of the indicator bolus; $V = (Q_B - Q_{UF}) * \Delta T_{Inj}$ where Q_B is a blood flow rate in the extracorporeal portion, Q_{UF} is an ultrafiltration rate of a dialysis system, ΔT_{Inj} is the transit time of the indicator bolus; and ΔU_{Inj} is integrated over ΔT_{Inj}.

9. (Previously presented) The method of Claim 8, wherein introducing the indicator bolus is effective to change an ultrasound velocity in the diluted blood.

10. (Previously presented) The method of Claim 8, wherein measuring a property of diluted blood includes measuring one of photometric, optical, electrical or thermal property of the diluted blood.

11. (Previously presented) The method of Claim 8, wherein measuring a property of diluted blood includes measuring one of protein concentration, saline, ultrasound velocity or electrolyte of the diluted blood.

12. (Currently amended) An apparatus for calibrating a blood property sensor in a blood system, comprising:

(a) an extracorporeal portion having a first end adapted to be connected to a vascular portion of the blood system at an upstream end and a second end adapted to be connected to the vascular portion at a downstream end;

(b) a blood property sensor coupled to the extracorporeal portion for detecting a property of diluted blood flowing within the extracorporeal portion; and

(c) means for determining a calibration coefficient of the blood property sensor corresponding to the detected property of the diluted blood and the relationship $K = -\frac{V_{Inj}}{V + V_{Inj}} * \Delta U_{Inj}$ where V_{Inj} is a volume of a dilution indicator forming the diluted blood; $V = (Q_B - Q_{UF}) * \Delta T_{Inj}$ where Q_B is a blood flow rate in the extracorporeal portion, Q_{UF} is an ultrafiltration rate of a dialysis system connected to the extracorporeal portion, ΔT_{Inj} is the transit time of the diluted blood; and ΔU_{Inj} is integrated over ΔT_{Inj}.

13. (Original) The apparatus of Claim 12, wherein the blood property sensor is one of a photometric, optical, electrical or thermal sensor.

14. (Original) The apparatus of Claim 12, wherein the extracorporeal portion includes an arterial length and the blood property sensor is located along the arterial length.

15. (Currently amended) An apparatus for calibrating a blood property sensor in a blood system having an extracorporeal portion, comprising:

(a) a blood property sensor coupled to the extracorporeal portion for detecting a property of diluted blood flowing within the extracorporeal portion; and

(b) means connected to the blood property sensor for determining a calibration coefficient of the blood property sensor corresponding to the detected property of the diluted blood in the extracorporeal portion and the relationship $K = -\frac{V_{Inj}}{V + V_{Inj}} * \Delta U_{Inj}$ where V_{Inj} is a volume of a dilution indicator forming the diluted blood; $V = (Q_B - Q_{UF}) * \Delta T_{Inj}$ where Q_B is a blood flow rate in the extracorporeal portion, Q_{UF} is an ultrafiltration rate of a dialysis system connected to the extracorporeal portion, ΔT_{Inj} is the transit time of the diluted blood; and ΔU_{Inj} is integrated over ΔT_{Inj}.

16. (Currently amended) A method of calibrating a blood property sensor in an extracorporeal blood circuit fluidly connected to a vascular blood circuit, the method comprising:

(a) introducing a change to a predetermined blood property;

(b) measuring a corresponding change in the blood property at a blood property sensor in the extracorporeal blood circuit; and

(c) determining a calibration coefficient of the blood property sensor corresponding to the measured change and the relationship $K = -\frac{V_{Inj}}{V + V_{Inj}} * \Delta U_{Inj}$ where V_{Inj} is a volume of a dilution indicator introducing the change in the predetermined blood property; $V = (Q_B - Q_{UF}) * \Delta T_{Inj}$ where Q_B is a blood flow rate in the extracorporeal blood circuit, Q_{UF} is an ultrafiltration rate of a dialysis system connected to the extracorporeal blood circuit, ΔT_{Inj} is the transit time of the dilution indicator; and ΔU_{Inj} is integrated over ΔT_{Inj}.

17. (Currently amended) A method of calibrating a blood property sensor in an extracorporeal blood circuit, the method comprising:

(a) introducing a known amount of indicator into an extracorporeal blood circuit;

(b) measuring a change in a blood parameter corresponding to passage of the indicator at a blood property sensor coupled to the extracorporeal blood circuit; and

(c) determining a calibration coefficient of the blood property sensor corresponding to the measured change and the relationship $K = -\frac{V_{Inj}}{V + V_{Inj}} * \Delta U_{Inj}$ where V_{Inj} is a volume of the introduced indicator; $V = (Q_B - Q_{UF}) * \Delta T_{Inj}$ where Q_B is a blood flow rate in the extracorporeal blood circuit, Q_{UF} is an ultrafiltration rate of a dialysis system connected to the extracorporeal blood circuit, ΔT_{Inj} is the transit time of the introduced indicator; and ΔU_{Inj} is integrated over ΔT_{Inj}.

18. (Currently amended) A method of calibrating a blood property sensor in an extracorporeal blood circuit fluidly connected to a vascular blood circuit, the method comprising:

(a) measuring a blood property of a dilution indicator bolus passing a blood property sensor in the extracorporeal blood circuit; and

(b) determining the calibration coefficient of the blood property sensor corresponding to the measured blood property and the relationship $K = -\frac{V_{Inj}}{V + V_{Inj}} * \Delta U_{Inj}$ where V_{Inj} is a volume of the dilution indicator; $V = (Q_B - Q_{UF}) * \Delta T_{Inj}$ where Q_B is a blood flow rate in the extracorporeal blood circuit, Q_{UF} is an ultrafiltration rate of a dialysis system connected to the extracorporeal blood circuit, ΔT_{Inj} is the transit time of the dilution indicator; and ΔU_{Inj} is integrated over ΔT_{Inj}.